

# New Hampshire Volunteer Lake Assessment Program

## 2002 Interim Report for Pawtuckaway Lake Nottingham



NHDES  
Water Division  
Watershed Management Bureau  
6 Hazen Drive  
Concord, NH 03301



# OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **PAWTUCKAWAY LAKE**, the program coordinators recommend the following actions.

## FIGURE INTERPRETATION

- **Figure 1 and Table 1:** The graphs in Figure 1 (Appendix A) show the historical and current year chlorophyll-a concentration in the water column. Table 1 (Appendix B) lists the maximum, minimum, and mean concentration for each sampling season that the lake has been monitored through the program.

Chlorophyll-a, a pigment naturally found in plants, is an indicator of the algal abundance. Because algae are usually microscopic plants that contain chlorophyll-a and are naturally found in lake ecosystems, the chlorophyll-a concentration found in the water gives an estimation of the concentration of algae or lake productivity. The mean (average) summer chlorophyll-a concentration for New Hampshire's lakes and ponds is 7.02 ug/L.

Similar to the summer of 2001, the summer of 2002 was filled with many warm and sunny days and there was a lower than normal amount of rainfall during the latter-half of the summer. The combination of these factors resulted in relatively warm surface waters throughout the state. The lack of fresh water to the lakes/ponds reduced the rate of flushing which may have resulted in water stagnation. Due to these conditions, many lakes and ponds experienced increased algae growth, including filamentous green algae (the billowy clouds of green algae typically seen floating near shore), and some lakes/ponds experienced nuisance cyanobacteria (blue-green algae) blooms.

For the **NORTH STATION**, the historical data (the bottom graph) show that the 2002 chlorophyll-a mean is **less than** the state mean. Overall, visual inspection of the historical data trend line (the bottom graph) shows **a variable, but overall increasing**, in-lake chlorophyll-a trend. This would mean that the chlorophyll-a concentration has somewhat fluctuated, but since monitoring began the concentration has generally **worsened**.

For the **SOUTH STATION**, the historical data (the bottom graph) show that the 2002 chlorophyll-a mean is ***less than*** the state mean. Overall, visual inspection of the historical data trend line (the bottom graph) also shows ***a variable, but overall increasing***, in-lake chlorophyll-a trend. This would mean that the chlorophyll-a concentration has somewhat fluctuated, but since monitoring began the concentration has generally ***worsened***. (However, it is important to note that the mean annual chlorophyll concentration has decreased since 2000. We hope this trend continues!)

The mean annual chlorophyll concentration was ***approximately the same*** at the NORTH and SOUTH stations this season.

For the 2003 annual report, since there will have been at least 10 consecutive years of sample collection for the lake, we will conduct a statistical analysis of the data. This will allow us to objectively determine if there has been a significant change in the annual mean chlorophyll-a concentration since monitoring began.

While algae are naturally present in all lakes/ponds, an excessive or increasing amount of any type is not welcomed. In freshwater lakes/ponds, phosphorus is the nutrient that algae depend upon for growth. Therefore, algal concentrations may increase when there is an increase in nonpoint sources of nutrient loading from the watershed, or in-lake sources of phosphorus loading (such as phosphorus releases from the sediments). It is important to continually educate residents about how activities within the watershed can affect phosphorus loading and lake quality.

- **Figure 2 and Table 3:** The graphs in Figure 2 (Appendix A) show historical and current year data for lake transparency. Table 3 lists the maximum, minimum and mean transparency data for each sampling season that the lake has been monitored through the program.

Volunteer monitors use the Secchi-disk, a 20 cm disk with alternating black and white quadrants, to measure water clarity (how far a person can see into the water). Transparency, a measure of water clarity, can be affected by the amount of algae and sediment from erosion, as well as the natural colors of the water. The mean (average) summer transparency for New Hampshire's lakes and ponds is 3.7 meters.

Two different weather related patterns occurred this past spring and summer that influenced lake quality during the summer season. In late May and early June of 2002, numerous rainstorms occurred. Stormwater runoff associated with these rainstorms may have increased phosphorus loading, and the amount of soil particles washed into waterbodies throughout the state. Some lakes and ponds experienced lower than typical transparency readings during late May and early June.

However, similar to the 2001 sampling season, the lower than average amount of rainfall and the warmer temperatures during the latter-half of the summer resulted in a few lakes/ponds reporting their best-ever Secchi-disk readings in July and August (a time when we often observe reduced clarity due to increased algal growth)!

For the **NORTH STATION**, the historical data (the bottom graph) show that the 2002 mean transparency is ***approximately equal to*** the state mean.

For the **SOUTH STATION**, the historical data (the bottom graph) show that the 2002 mean transparency is slightly ***greater than*** the state mean. It is worthy to note that the transparency results have slightly increased for the past three years; we hope this trend continues!

Overall, visual inspection of the historical data trend line (the bottom graph) shows ***a relatively stable*** trend for in-lake transparency, for the **NORTH** and **SOUTH** station. Specifically, the mean annual transparency has at both stations has generally ranged between approximately 3 and 4 meters since monitoring began.

Again, for the 2003 annual report, since there will have been at least 10 consecutive years of sample collection for the lake, we will conduct a statistical analysis of the data. This will allow us to objectively determine if there has been a significant change in the annual mean transparency since monitoring began.

Typically, high intensity rainfall causes erosion of sediments into the lake and streams, thus decreasing clarity. Efforts should continually be made to stabilize stream banks, lake shorelines, disturbed soils within the watershed, and especially dirt roads located immediately adjacent to the edge of tributaries and the lake. Guides to Best Management Practices designed to reduce, and possibly even eliminate, nonpoint source pollutants are available from NHDES upon request.

- **Figure 3 and Table 8:** The graphs in Figure 3 (Appendix A) show the amounts of phosphorus in the epilimnion (the upper layer) and the hypolimnion (the lower layer); the inset graphs show current year data. Table 8 (Appendix B) lists the annual maximum, minimum, and median concentration for each deep spot layer and each tributary since the lake has joined the program.

Phosphorus is the limiting nutrient for plant and algae growth in New Hampshire's freshwater lakes and ponds. Too much phosphorus in a lake/pond can lead to increases in plant and algal growth over time. The median summer total phosphorus concentration in the epilimnion (upper layer) of New Hampshire's lakes and ponds is 11 ug/L. The median summer phosphorus concentration in the hypolimnion (lower layer) is 14 ug/L.

For the **NORTH STATION**, the historical data for the epilimnion (upper layer) show that the 2002 total phosphorus mean is slightly **greater than** the state median. Overall, visual inspection of the historical data trend line for the epilimnion shows a relatively **stable** total phosphorus trend, which means that the concentration has remained **approximately the same** in the epilimnion since monitoring began.

The historical data for the hypolimnion (lower layer) show that the 2002 total phosphorus mean is **much greater than** the state median. Overall, visual inspection of the historical data trend line for the hypolimnion shows **an increasing** total phosphorus trend, which means that the concentration has **worsened** in the hypolimnion since monitoring began. It is important to note that the total phosphorus concentration steadily increased in the hypolimnion throughout the summer (see 2002 monthly results graph insert). This may be due to decreasing dissolved oxygen levels during the summer months, causing **internal phosphorus loading**. Further discussion of internal loading is found in the interpretation of Table 10 in the next section of this report.

For the **SOUTH STATION**, the historical data for the epilimnion (upper layer) show that the 2002 total phosphorus mean is slightly **greater than** the state median. Overall, visual inspection of the historical data trend line for the epilimnion shows a relatively **stable** total phosphorus trend (with the exception of a high concentration in 1996), which means that the concentration has remained **approximately the same** in the epilimnion since monitoring began.

The historical data for the hypolimnion (lower layer) show that the 2002 total phosphorus mean is **greater than** the state median. Overall, visual inspection of the historical data trend line for the hypolimnion shows **a variable** total phosphorus trend, which means

that the concentration has *fluctuated* in the hypolimnion since monitoring began.

As discussed previously, in the 2003 annual report we will conduct a statistical analysis of the data. This will allow us to objectively determine if there has been a significant change in the annual mean total phosphorus concentration since monitoring began.

One of the most important approaches to reducing phosphorus loading to a waterbody is to continually educate watershed residents about its sources and how excessive amounts can adversely impact the ecology and value of lakes and ponds. Phosphorus sources within a lake or pond's watershed typically include septic systems, animal waste, lawn fertilizer, road and construction erosion, and natural wetlands. If you would like to educate watershed residents about how they can help to reduce phosphorus loading into the lake, please contact the VLAP Coordinator.

#### **TABLE INTERPRETATION**

##### **➤ Table 2: Phytoplankton**

In the **NORTH STATION** one of the most dominant species in the plankton sample was the cyanobacteria ***Oscillatoria***. Small amounts of the cyanobacterium ***Coelosphaerium***, ***Microcystis***, ***Chroococcus***, ***Anabaena***, ***Aphanizomenon***, were also observed in the plankton sample this season.

In the **SOUTH STATION** the most dominant species of phytoplankton was the cyanobacterium ***Oscillatoria***, which was found to have a relative abundance of 96%. Small amounts of the cyanobacterium ***Coelosphaerium***, ***Chroococcus***, and ***Anabaena*** were also found in the plankton sample this season.

***If present in large amounts, many of these cyanobacteria species can be toxic to livestock, wildlife, pets, and humans*** (Refer to page 14 of the "Biological Monitoring Parameters" section of this report for a more detailed explanation). Cyanobacteria can reach nuisance levels when excessive nutrients and favorable environmental conditions occur. As with the summer of 2001, we observed that some lakes and ponds had cyanobacteria present during the 2002 summer season, likely due to the many warm and sunny days that occurred this summer, which may have accelerated algal and bacterial growth. In addition, the lower than normal amount of rainfall during the latter half of the summer, meant that the slow flushing rates resulted in less phosphorus exiting the lake outlet and more phosphorus being available for plankton growth.

The presence of cyanobacteria serves as a reminder of the lake's delicate balance. Watershed residents should continue to act proactively to reduce nutrient loading into the lake/pond by eliminating fertilizer use on lawns, keeping the lake shoreline natural, re-vegetating cleared areas within the watershed, and properly maintaining septic systems and roads.

In addition, residents should also observe the lake in September and October during the time of fall turnover (lake mixing) to document any blooms that may occur. Cyanobacteria have the ability to regulate their depth in the water column by producing or releasing gas from vesicles. However, occasionally lake mixing can affect their buoyancy and cause them to rise to the surface and bloom. Wind and currents tend to "pile" cyanobacteria into "surface scums" that accumulate in one section of the lake/pond. If a fall bloom occurs, please contact the VLAP Coordinator.

➤ **Table 4: pH**

Table 4 (Appendix B) presents the in-lake and tributary current year and historical pH data.

pH is measured on a logarithmic scale of 0 (acidic) to 14 (basic). pH is important to the survival and reproduction of fish and other aquatic life. A pH below 5.5 severely limits the growth and reproduction of fish. A pH between 6.5 and 7.0 is ideal for fish. The mean pH value for the epilimnion (upper layer) in New Hampshire's lakes and ponds is 6.5, which indicates that the surface waters in state are slightly acidic. For a more detailed explanation regarding pH, please refer to page 16 of the "Chemical Monitoring Parameters" section of this report.

Due to the presence of granite bedrock in the state and the deposition of acid rain, there is not much that can be done to effectively increase lake/pond pH.

➤ **Table 5: Acid Neutralizing Capacity**

Table 5 in Appendix B presents the current year and historic epilimnetic ANC for each year the lake/pond has been monitored through VLAP.

Buffering capacity or ANC describes the ability of a solution to resist changes in pH by neutralizing the acidic input to the lake. For a more detailed explanation, please refer to page 16 of the "Chemical Monitoring Parameters" section of this report.

➤ **Table 6: Conductivity**

Table 6 in Appendix B presents the current and historic conductivity values for tributaries and in-lake data. Conductivity is the numerical expression of the ability of water to carry an electric current. For a more detailed explanation, please refer to page 16 of the “Chemical Monitoring Parameters” section of this report.

The conductivity has ***continued to remain high*** in **WHITE GROVE BROOK and FERNALDS BROOK** this season (Table 6). Typically, sources of increased conductivity are due to human activity. These activities include septic systems that fail and leak leachate into the groundwater (and eventually into the tributaries and the lake/pond), agricultural runoff, and road runoff (which contains road salt during the spring snow melt). New development in the watershed can alter runoff patterns and expose new soil and bedrock areas, which could contribute to increasing conductivity. In addition, natural sources, such as iron deposits in bedrock, can influence conductivity. It is possible that the lower than normal amount rainfall during the latter-half of the summer reduced tributary and lake flushing, which allowed pollutants and ions to build up and resulted in elevated conductivity levels. We recommend that your monitoring group conduct stream surveys and stormwater sampling along these inlets so that we can determine what may be causing the increases. For a detailed explanation on how to conduct stormwater sampling, please refer to this year’s “Special Topic Article” which is included in Appendix D of this report.

➤ **Table 8: Total Phosphorus**

Table 8 in Appendix B presents the current year and historic total phosphorus data for in-lake and tributary stations. Phosphorus is the nutrient that limits the algae’s ability to grow and reproduce. Please refer to page 17 of the “Chemical Monitoring Parameters” section of this report for a more detailed explanation.

The total phosphorus concentration ***continue to remain very high*** in **FERNALDS BROOK, FUNDY BROOK, and ROUND POND BROOK** this season. These stations have had a history of ***fluctuating*** total phosphorus concentrations. We recommend that your monitoring group conduct stream surveys and stormwater sampling along these inlets so that we can determine what may be causing the increases. For a detailed explanation on how to conduct stormwater sampling, please refer to this year’s “Special Topic Article” which is included in Appendix D of this report.

➤ **Table 9: Dissolved Oxygen and Temperature Profile (current year)**

Table 9 in Appendix B shows the dissolved oxygen/temperature profile(s) for the 2002 sampling season. The presence of dissolved oxygen is vital to fish and amphibians in the water column and also to bottom-dwelling organisms. Please refer to the “Chemical Monitoring Parameters” section of this report for a more detailed explanation.

For both the **NORTH STATION** and the **SOUTH STATION** The dissolved oxygen concentration was **high** in the epilimnion and metalimnion (middle layer), however, the concentration in the hypolimnion (lower layer) was **low**. This is a sign of the lake’s/pond’s aging and declining health. Please refer to the Table 10 discussion for a more detailed explanation.

➤ **Table 10: Historical Hypolimnetic Dissolved Oxygen**

Table 10 in Appendix B shows the historical and current year dissolved oxygen concentration in the hypolimnion (lower layer).

The dissolved oxygen concentration was **low in the hypolimnion** at **both deep spots** of the lake. As stratified lakes/ponds age, oxygen becomes **depleted** in the hypolimnion (the lower layer) by the process of decomposition. In addition, depleted oxygen concentration in the hypolimnion of thermally stratified lakes/ponds typically occurs as the summer progresses. Specifically, the loss of oxygen in the hypolimnion results primarily from the process of biological breakdown of organic matter (i.e.; biological organisms use oxygen to break down organic matter), both in the water column and particularly at the bottom of the lake/pond where the water meets the sediment.

In addition, during this season, and many past sampling seasons the lake has had a lower dissolved oxygen concentration and a higher total phosphorus concentration in the hypolimnion (the lower layer) than in the epilimnion (the upper layer). As mentioned before, these data suggest that the process of **internal total phosphorus loading** (commonly referred to as **internal loading**) is occurring in the lake. When oxygen levels are depleted to less than 1 mg/L in the hypolimnion (as it was this season and in many past seasons), the phosphorus that is normally bound up with metals in the sediment may be re-released into the water column.

Again, this may explain why the phosphorus concentration in the hypolimnion is **greater** than the phosphorus concentration in epilimnion. Since an internal source of phosphorus in the lake may be present, it is even more important that watershed residents act

proactively to minimize external phosphorus loading from the watershed.

The **low** oxygen level in the hypolimnion is a sign of the lake's **aging** and **declining** health. This year the DES biologist conducted the temperature/dissolved oxygen profile in **AUGUST**. We recommend that the annual biologist visit for the 2003 sampling season be scheduled during **JUNE** so that we can determine if oxygen is depleted in the hypolimnion **earlier** in the sampling season.

➤ **Table 11: Turbidity**

Table 11 in Appendix B lists the current year and historic data for in-lake and tributary turbidity. Turbidity in the water is caused by suspended matter, such as clay, silt, and algae. Water clarity is strongly influenced by turbidity. Please refer to page 19 of the "Other Monitoring Parameters" section of this report for a more detailed explanation.

The turbidity of the hypolimnion (lower layer) sample was elevated on **several** sampling events this season. This suggests that the lake bottom may have been disturbed by the anchor or by the Kemmerer Bottle while sampling. When the lake bottom is disturbed, sediment, which typically contains attached phosphorus, is released into the water column. When collecting the hypolimnion sample, please check to make sure that there is no sediment in the Kemmerer Bottle before filling the sample bottles.

### **OTHER COMMENTS**

Since 1999, staff from DES and the Natural Resource Conservation Service (NRCS) have been working with the owners of the Batchelder Farm, which is located near Fernald's Brook, to implement best management practices (BMPs) to address sources of nonpoint source pollution. Many BMPs have been implemented and some are a still work-in-progress. Unfortunately, some of the BMPs have failed for various reasons. Below is a summary of the BMPs that have been implemented. DES will continue to coordinate efforts with the NRCS to ensure that all BMPs are installed as recommended.

#### **October 1999:**

- Constructed wetland with rock-lined outlet installed for the treatment of milkhouse waste.
- Cows fenced out of the existing pond and vegetated buffer established. (However, during the fall of 2002, DES observed that the fence has been removed so that the well can be accessed. DES

will contact NRCS to determine if/when the fencing will be re-installed.)

- Earthen diversion installed below constructed wetland area to reduce slope length and increase the detention time for (and subsequent treatment of) barnyard runoff.
- Runoff and erosion control measures installed on the gravel road accessing the rear of the barn (where manure is stockpiled). Previous access was seasonal, not allowing for timely removal of “raw compost”.

**April 2000:**

- Greenhouse-type barn erected to provide confinement of replacement heifers.

**May 2000:**

- Owners purchase 58 acres directly across the street from the home farm (eastside of Rte 156).
- Composted manure bagged and sold commercially at 2 separate locations in Nottingham. Very successful!

**June 2000:**

- Batchelder Farm approved for funding (provided through the Environmental Quality Incentive Program) to construct a concrete containment area for “raw compost” (manure and bedding stockpiled on the farm after removal from the barns and prior to transport off the site). The formation of windrows and the composting process itself takes place at owners father’s farm on Route 152, and is outside the Pawtuckaway Lake watershed. Equipment funding will also be used to complete the roof over the “milker” feedlot constructed in 1997. (During the spring of 2003 DES will determine if this is still the plan.)

**Since 2001:**

- Roofing for a concrete pad for cows and fencing a small turn-out area was installed. Fencing was to be re-established adjacent to the barn (by November 2002) to keep cows out of constructed wetland area. DES has contacted NRCS for dimensions of the roof structure and linear feet of fencing placed. In addition DES will contact NRCS for future BMP plans for the site.

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## DATA QUALITY ASSURANCE AND CONTROL

### **Annual Assessment Audit:**

During the annual visit to your lake, the biologist conducted a “Sampling Procedures Assessment Audit” for your monitoring group. Specifically, the biologist observed the performance of your monitoring group while sampling and filled out an assessment audit sheet to document the ability of the volunteer monitors to follow the proper field sampling procedures (as outlined in the VLAP Monitor’s Field Manual). This assessment is used to identify any aspects of sample collection in which volunteer monitors are not following the proper procedures, and also provides an opportunity for the biologist to retrain the volunteer monitors as necessary. This will ultimately ensure that the samples that the volunteer monitors collect are truly representative of actual lake and tributary conditions.

Overall, your monitoring group performed **very well** while collecting samples on the annual biologist visit this season! Specifically, the members of your monitoring group followed the majority of the proper field sampling procedures. The biologist did identify a few aspects regarding sample collection that the volunteer monitors could improve upon. They are as follows:

- **Finding the deep spot:** Please remember to locate the deep spot using three reference points from the shoreline. This method is known as **triangulation**. In addition, depth finders and Global Positioning System (GPS) technology may be used to further pinpoint the location of the deep spot. In addition, please remember to check the depth of the deep spot by **sounding** to ensure that you have actually located the deepest spot. To sound the bottom, simply fill the Kemmerer bottle with lake water from the surface and then lower the bottle into the lake until you feel it touch the bottom. When you have reached the bottom, check the depth on the calibrated chain. You may need to move to another location and repeat this procedure a few times until the deepest spot is located. When you have found the deep spot, please remember to write the depth of the field data sheet. Please note, sounding may disturb the sediment, so please allow the bottom to settle out before collecting the deepest sample.
- **Tributary Station Location:** DES is uncertain as to where a few of the tributary sampling stations are located, particularly with respect to Fernald’s Brook and the farms in this portion of the watershed. Please document the locations of Stations #08 Fernalds A and #09 Fernalds B on a topographical map and/or street map and send a copy to the VLAP Coordinator at NHDES, 6 Hazen Drive, Concord, NH 03302. If you need a copy of a map to do so, please contact the VLAP Coordinator at (603) 271-2658.

**Sample Receipt Checklist:**

Each time your monitoring group dropped off samples at the laboratory this summer, the laboratory staff completed a sample receipt checklist to assess and document if the volunteer monitors followed proper sampling techniques when collecting the samples. The purpose of the sample receipt checklist is to minimize, and hopefully eliminate, future re-occurrences of improper sampling techniques.

Overall, the sample receipt checklist showed that your monitoring group did a **very good** job when collecting samples this season! Specifically, the members of your monitoring group followed the majority of the proper field sampling procedures when collecting and submitting samples to the laboratory. However, the laboratory did identify a few aspects of sample collection that the volunteer monitors could improve upon. They are as follows:

- **Tributary Sampling:** Please do not sample tributaries that are not flowing. Due to the lack of flushing, stagnant water typically contains elevated amounts of chemical and biological constituents that will lead to erroneous results.
- **Collecting Samples:** Please make sure that for each sample the bottle is filled to the appropriate level (to the neck).
- **Field Data Sheets:** Remember to fill in the name of your lake and the town at the top of each field data sheet. This is to prevent any confusion or errors when analyzing samples or logging in data.

**NOTES**

- **Biologist Note (8/20/02):**  
**NORTH STATION:** The chlorophyll-a sample had a green-blue color.  
**SOUTH STATION:** A cormorant and a heron were observed. The volunteers reported seeing 3 loons and commented on the increasing number of herons and loons on the lake.

**USEFUL RESOURCES**

*Changes to the Comprehensive Shoreland Protection Act: 2001 Legislative Session*, NHDES Fact Sheet, (603) 271-3505, or [www.des.state.nh.us/factsheets/sp/sp-8.htm](http://www.des.state.nh.us/factsheets/sp/sp-8.htm)

*Cyanobacteria in New Hampshire Waters Potential Dangers of Blue-Green Algae Blooms*, NHDES Fact Sheet, (603) 271-3505, or [www.des.state.nh.us/factsheets/wmb/wmb-10.htm](http://www.des.state.nh.us/factsheets/wmb/wmb-10.htm)

*The Lake Pocket Book.* Prepared by The Terrene Institute, 2000. (internet: [www.terrene.org](http://www.terrene.org), phone 800-726-4853)

*Managing Lakes and Reservoirs, Third Edition, 2001.* Prepared by the North American Lake Management Society (NALMS) and the Terrene Institute in cooperation with the U.S. Environmental Protection Agency. Copies are available from NALMS (internet: [www.nalms.org](http://www.nalms.org), phone 608-233-2836), and the Terrene Institute (internet: [www.terrene.org](http://www.terrene.org), phone 800-726-4853)

*Organizing Lake Users: A Practical Guide.* Written by Gretchen Flock, Judith Taggart, and Harvey Olem. Copies are available from the Terrene Institute (internet: [www.terrene.org](http://www.terrene.org), phone 800-726-4853)

*Proper Lawn Care in the Protected Shoreland: The Comprehensive Shoreland Protection Act, WD-SP-2, NHDES Fact Sheet, (603) 271-3503 or [www.des.state.nh.us/factsheets/sp/sp-2.htm](http://www.des.state.nh.us/factsheets/sp/sp-2.htm)*

*Sand Dumping - Beach Construction, WD-BB-15, NHDES Fact Sheet, (603) 271-3503 or [www.des.state.nh.us/factsheets/bb/bb-15.htm](http://www.des.state.nh.us/factsheets/bb/bb-15.htm)*

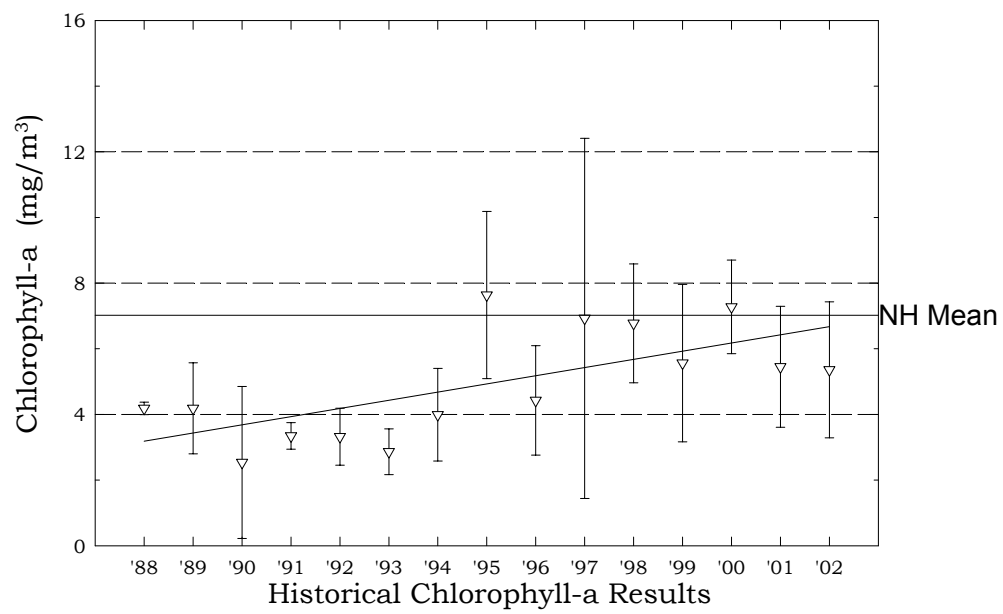
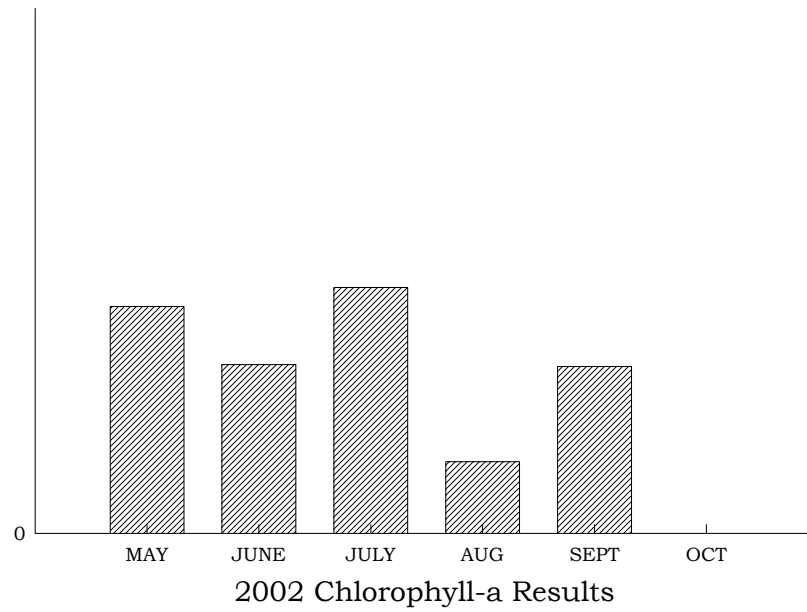
*Swimmers Itch, WD-BB-2, NHDES Fact Sheet, (603) 271-3503 or [www.des.state.nh.us/factsheets/bb/bb-2.htm](http://www.des.state.nh.us/factsheets/bb/bb-2.htm)*

*Use of Lakes or Streams for Domestic Water Supply, WD-WSEB-1-11, NHDES Fact Sheet, (603) 271-3503 or [www.des.state.nh.us/factsheets/ws/ws-1-11.htm](http://www.des.state.nh.us/factsheets/ws/ws-1-11.htm)*

*Water Milfoil, WD-BB-1, NHDES Fact Sheet, (603) 271-3503 or [www.des.state.nh.us/factsheets/bb/bb-1.htm](http://www.des.state.nh.us/factsheets/bb/bb-1.htm)*

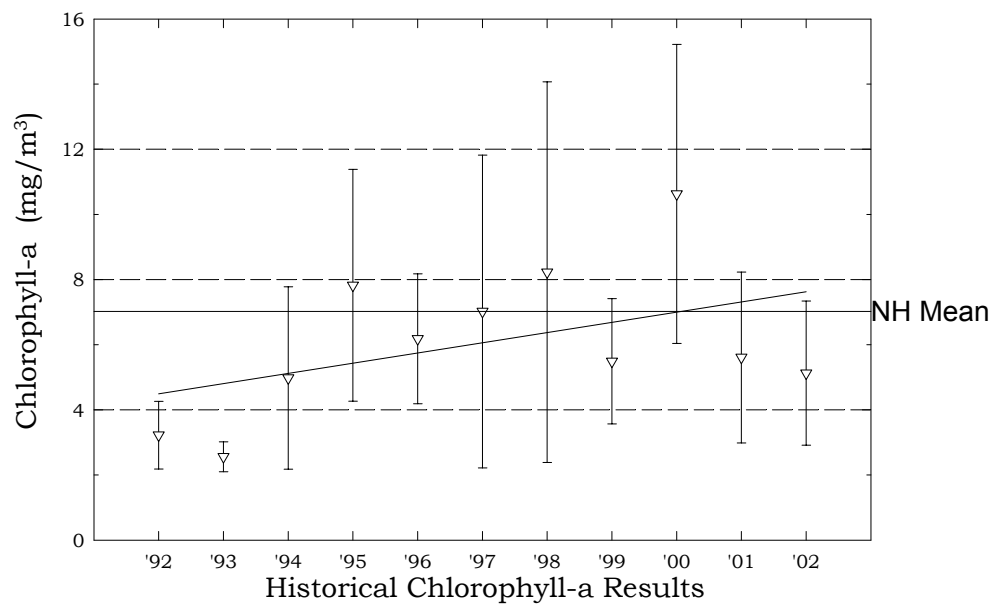
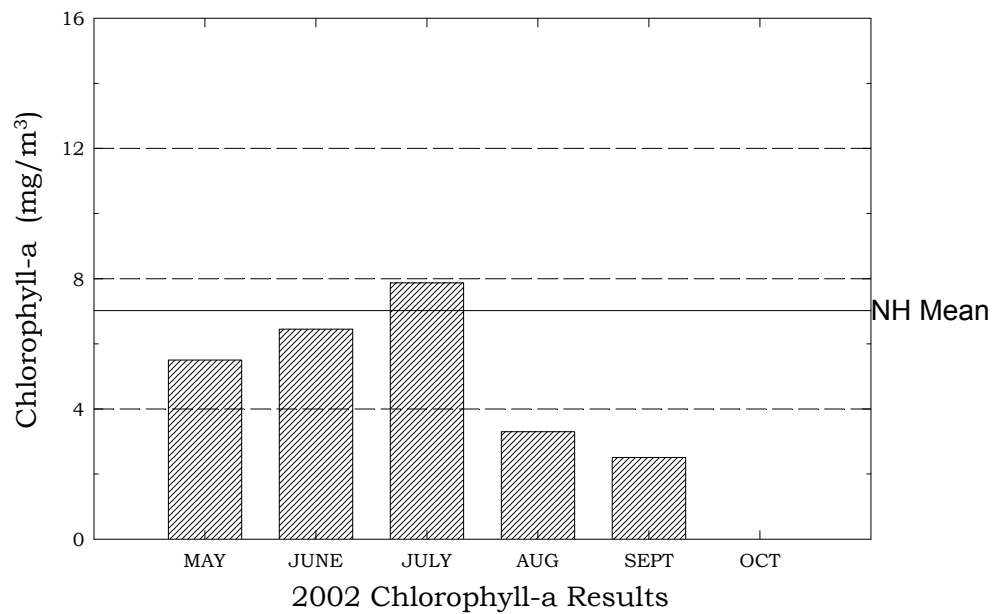
*Weed Watchers: An Association to Halt the Spread of Exotic Aquatic Plants, WD-BB-4, NHDES Fact Sheet, (603) 271-3503 or [www.des.state.nh.us/factsheets/bb/bb-4.htm](http://www.des.state.nh.us/factsheets/bb/bb-4.htm)*

# Appendix A: Graphs



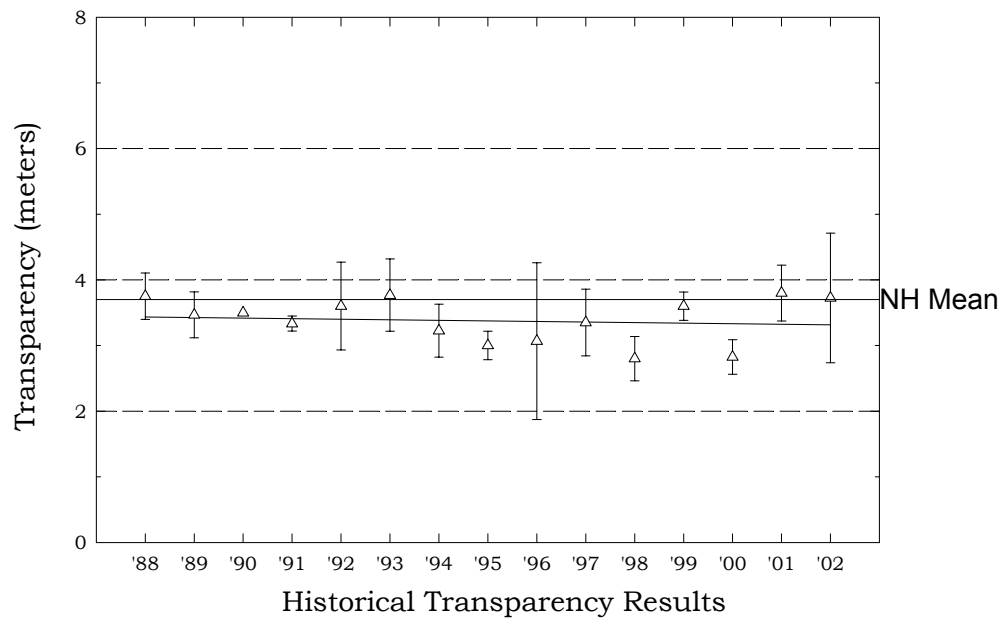
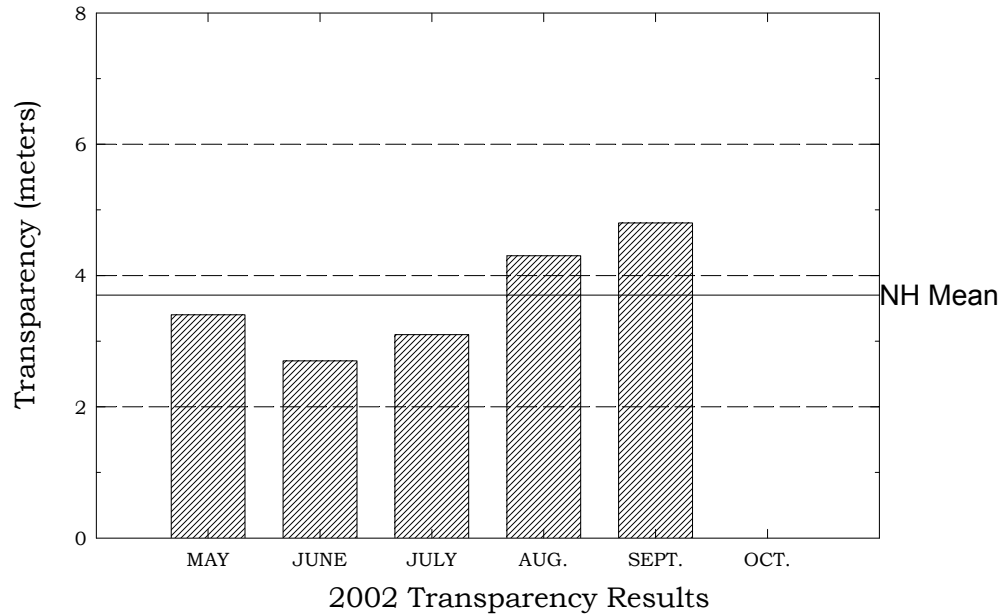
# Pawtuckaway Lake, South, Nottingham

**Figure 1.** Monthly and Historical Chlorophyll-a Results



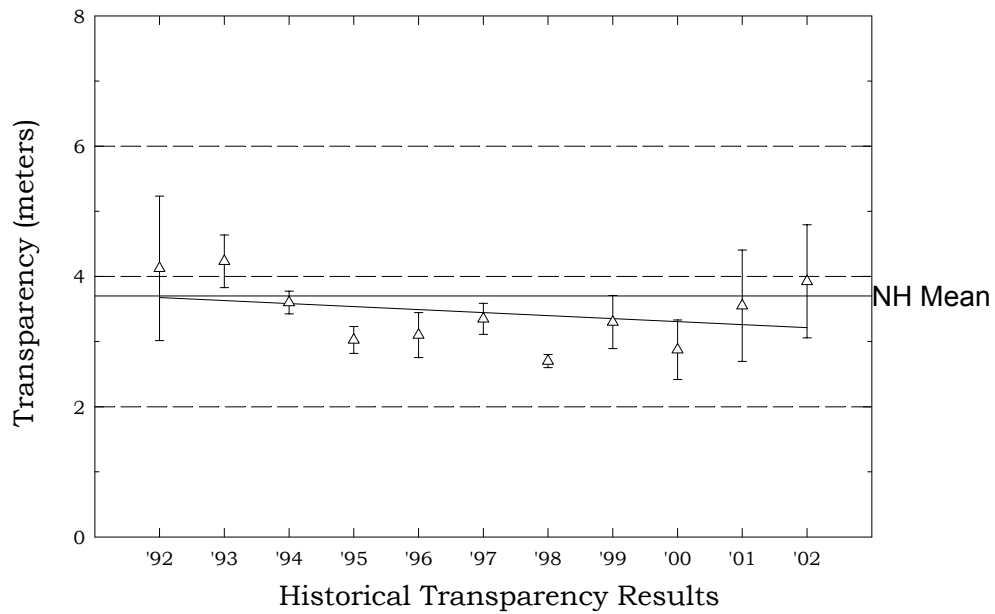
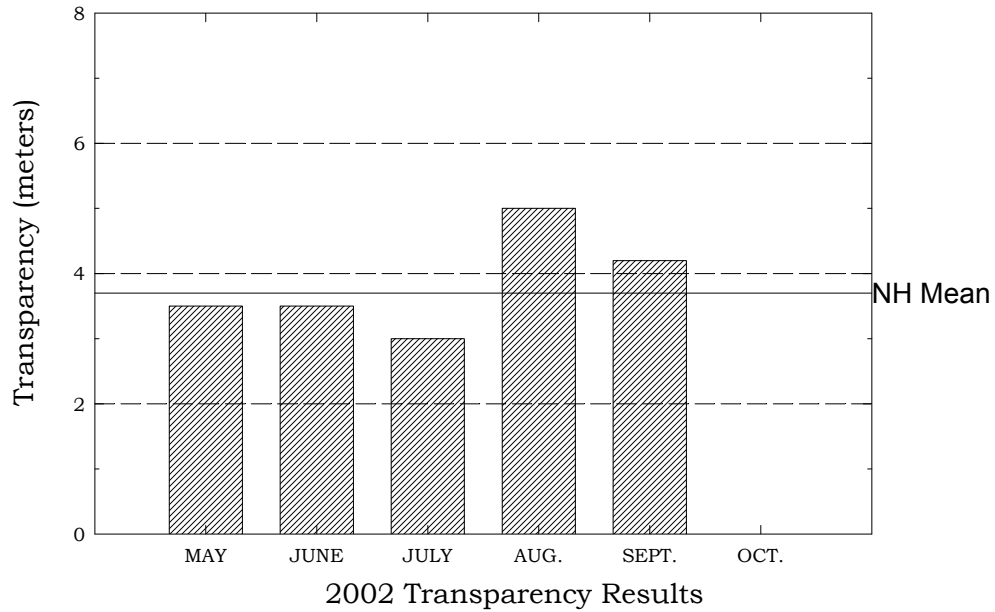
# Pawtuckaway Lake, North, Nottingham

**Figure 2.** Monthly and Historical Transparency Results



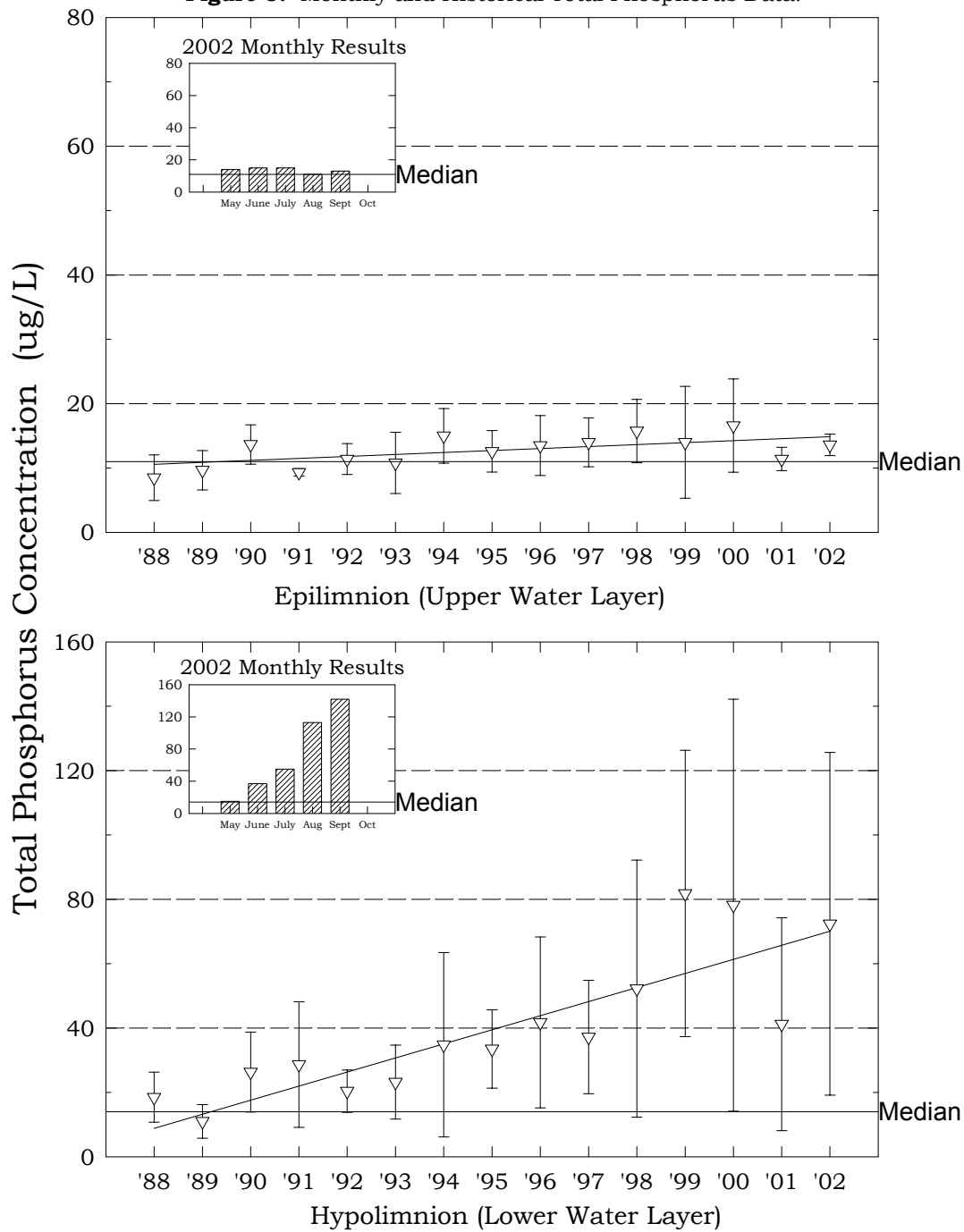
## Pawtuckaway Lake, South, Nottingham

**Figure 2.** Monthly and Historical Transparency Results



# Pawtuckaway Lake, North, Nottingham

**Figure 3.** Monthly and Historical Total Phosphorus Data.



# Pawtuckaway Lake, South, Nottingham

**Figure 3.** Monthly and Historical Total Phosphorus Data.

